MAXREFDES64# Code Documentation

V01.00

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Chapter 1

Main Page

1.1 Introduction

This is the code documentation for the MAXREFDES64# subsystem reference design.

The Files page contains the File List page and the Globals page.

The Globals page contains the Functions, Variables, and Macros sub-pages.

Chapter 2

File Index

2.1 File List

Here is a list of all files with brief descriptions:

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Chapter 3

File Documentation

3.1 init_config.c File Reference

```
#include "stm32f10x.h"
#include "stm32f10x_gpio.h"
#include "stm32f10x_usart.h"
#include "stm32f10x_spi.h"
#include "init_config.h"
```

Functions

- void maxim_uart_init (void)

  Initialize the UART peripheral.
- void maxim_gpio_init (void)

  Initialize the GPIO peripheral.
- void maxim_spi_init (void)

  Initialize the SPI peripheral.

Variables

- GPIO_InitTypeDef gpio_init_structure
- SPI_InitTypeDef spi_init_structure
- USART_InitTypeDef usart_init_structure

3.1.1 Detailed Description

****

Project: MAXREFDES64# Filename: init_config.c Description: This module contains all the functions used to initialize the STM32F1 peripherals

Revision History:

10/07/2014 Rev 01.00 MG Initial release.

This code follows the following naming conventions:

char ch_pmod_value

char (array) s_pmod_string[16]

float f_pmod_value

int n_pmod_value

int (array) an_pmod_value[16]

u16 u_pmod_value

u16 (array) au_pmod_value[16]

u8 uch_pmod_value

u8 (array) auch_pmod_buffer[16]

unsigned int un_pmod_value

int * pun_pmod_value

Definition in file init_config.c.

3.1.2 Function Documentation

3.1.2.1 void maxim_gpio_init (void)

Initialize the GPIO peripheral.

Details

This function initializes the GPIO that are used in this application

Parameters

None	

Return values

None	

Definition at line 112 of file init_config.c.

3.1.2.2 void maxim_spi_init (void)

Initialize the SPI peripheral.

Details

This function initializes the SPI2 peripheral
CS is controlled by GPIO PB12

Parameters

None	

Return values

None	

Definition at line 158 of file init_config.c.

3.1.2.3 void maxim_uart_init (void)

Initialize the UART peripheral.

Details

This function initializes the UART peripheral that connects to the terminal program.
The baud rate is set to 460800

Parameters

None	

Return values

None	

Definition at line 71 of file init_config.c.

3.1.3 Variable Documentation

3.1.3.1 GPIO_InitTypeDef gpio_init_structure

Definition at line 67 of file init_config.c.

3.1.3.2 SPI_InitTypeDef spi_init_structure

Definition at line 68 of file init_config.c.

3.1.3.3 USART_InitTypeDef usart_init_structure

Definition at line 69 of file init_config.c.

3.2 init_config.h File Reference

Functions

- void maxim_uart_init (void)
  Initialize the UART peripheral.
- void maxim_spi_init (void)
  Initialize the SPI peripheral.
- void maxim_gpio_init (void)
  Initialize the GPIO peripheral.

3.2.1 Detailed Description

****

Project: MAXREFDES64# Filename: init_config.h Description: This module contains all the functions used to initialize the STM32F1 peripherals

Revision History:

10/07/2014 Rev 01.00 MG Initial release.

This code follows the following naming conventions:

char ch_pmod_value

char (array) s_pmod_string[16]

float f_pmod_value

int n_pmod_value

int (array) an_pmod_value[16]

u16 u_pmod_value

u16 (array) au_pmod_value[16]

u8 uch_pmod_value

u8 (array) auch_pmod_buffer[16]

unsigned int un_pmod_value

int * pun_pmod_value

Definition in file init_config.h.

3.2.2 Function Documentation

3.2.2.1 void maxim_gpio_init (void)

Initialize the GPIO peripheral.

Details

This function initializes the GPIO that are used in this application

Parameters

None	

Return values

None	

Definition at line 112 of file init_config.c.

3.2.2.2 void maxim_spi_init (void)

Initialize the SPI peripheral.

Details

This function initializes the SPI2 peripheral
CS is controlled by GPIO PB12

Parameters

None	

Return values

None	

Definition at line 158 of file init_config.c.

3.2.2.3 void maxim_uart_init (void)

Initialize the UART peripheral.

Details

This function initializes the UART peripheral that connects to the terminal program.
The baud rate is set to 460800

Parameters

None	

Return values

None	

Definition at line 71 of file init_config.c.

3.3 max31913.c File Reference

```
#include "max31913.h"
#include "stm32f10x_gpio.h"
#include "stm32f10x_spi.h"
```

Functions

- uint16_t maxim_spi_16bit_transfer (uint16_t u_mosi)

  SPI 16-bit transfer.

3.3.1 Detailed Description

```
*****************************************************
```

Project: MAXREFDES64# Filename: max31913.c Description: This module is an embedded controller driver for the MAXREFDES64#. It contains high level functions: maxim_spi_16bit_transfer

```
This driver can be dropped into a user's application as a starting
point for development of an end application
```

Revision History:

10/07/2014 Rev 01.00 MG Initial release.

This code follows the following naming conventions:

char ch_pmod_value

char (array) s_pmod_string[16]

float f_pmod_value

int n_pmod_value

int (array) an_pmod_value[16]

u16 u_pmod_value

u16 (array) au_pmod_value[16]

u8 uch_pmod_value

u8 (array) auch_pmod_buffer[16]

unsigned int un_pmod_value

int * pun_pmod_value

Definition in file max31913.c.

3.3.2 Function Documentation

3.3.2.1 uint16_t maxim_spi_16bit_transfer (uint16_t *u_mosi*)

SPI 16-bit transfer.

Parameters

in	*u_mosi,:*	SPI transmit data

Return values

SPI	receive data

Definition at line 69 of file max31913.c.

3.4 max31913.h File Reference

```
#include "stm32f10x.h"
```

Functions

- uint16_t maxim_spi_16bit_transfer (uint16_t u_mosi)

  SPI 16-bit transfer.

3.4.1 Detailed Description

****

Project: MAXREFDES64# Filename: max31913.h Description: This module is an embedded controller driver for the MAXREFDES64#. It contains high level functions: maxim_spi_16bit_transfer

```
This driver can be dropped into a user's application as a starting
point for development of an end application
```

Revision History:

10/07/2014 Rev 01.00 MG Initial release.

This code follows the following naming conventions:

char ch_pmod_value

char (array) s_pmod_string[16]

float f_pmod_value

int n_pmod_value

int (array) an_pmod_value[16]

u16 u_pmod_value

u16 (array) au_pmod_value[16]

u8 uch_pmod_value

u8 (array) auch_pmod_buffer[16]

unsigned int un_pmod_value

int * pun_pmod_value

Definition in file max31913.h.

3.4.2 Function Documentation

3.4.2.1 uint16_t maxim_spi_16bit_transfer (uint16_t *u_mosi*)

SPI 16-bit transfer.

Parameters

in	*u_mosi,:*	SPI transmit data

Return values

SPI	receive data

Definition at line 69 of file max31913.c.

3.5 maxrefdes64.c File Reference

```
#include "stm32f10x.h"
#include "stm32f10x_gpio.h"
#include "stm32f10x_rcc.h"
#include "stm32f10x_usart.h"
#include "stm32f10x_spi.h"
#include "init_config.h"
#include "menu.h"
#include "utilities.h"
#include "max31913.h"
#include <stdio.h>
```

Macros

- #define BYTETOBINARYPATTERN "%d%d%d%d%d%d%d%d"
- #define BYTETOBINARY(byte)
- #define MAJOR_REVISION 01
- #define MINOR_REVISION 00

Functions

- int main (void)

  Main function for MAXREFDES64.

3.5.1 Detailed Description

****

Project: MAXREFDES64# Filename: maxrefdes64.c Description: This module contains the Main application for the MAXREFDES64 example program.

Revision History:

10-07-14 Rev 01.00 MG Initial release.

This code follows the following naming conventions:

char ch_pmod_value

char (array) s_pmod_string[16]

float f_pmod_value

int n_pmod_value

int (array) an_pmod_value[16]

u16 u_pmod_value

u16 (array) au_pmod_value[16]

u8 uch_pmod_value

u8 (array) auch_pmod_buffer[16]

unsigned int un_pmod_value

int * pun_pmod_value

Definition in file maxrefdes64.c.

3.5.2 Macro Definition Documentation

3.5.2.1 #define BYTETOBINARY(*byte*)

Value:

```
(byte & 0x80 ? 1 : 0), \
  (byte & 0x40 ? 1 : 0), \
  (byte & 0x20 ? 1 : 0), \
  (byte & 0x10 ? 1 : 0), \
  (byte & 0x08 ? 1 : 0), \
  (byte & 0x04 ? 1 : 0), \
  (byte & 0x02 ? 1 : 0), \
  (byte & 0x01 ? 1 : 0)
```

Definition at line 88 of file maxrefdes64.c.

3.5.2.2 #define BYTETOBINARYPATTERN "%d%d%d%d%d%d%d%d"

Definition at line 87 of file maxrefdes64.c.

3.5.2.3 #define MAJOR_REVISION 01

Definition at line 100 of file maxrefdes64.c.

3.5.2.4 #define MINOR_REVISION 00

Definition at line 101 of file maxrefdes64.c.

3.5.3 Function Documentation

3.5.3.1 int main (void)

Main function for MAXREFDES64.

Details

This function initializes the peripherals and hardware. Displays the menu on the terminal program for user control.

Parameters

None	

Return values

Always	TRUE

Definition at line 115 of file maxrefdes64.c.

3.6 menu.c File Reference

```
#include "stdio.h"
#include "menu.h"
```

Functions

- void maxim_menu_cls ()

  Function to clear the screen via Hyperterminal.
- void maxim_menu_print_maxim_banner ()

  Print standard Maxim banner at top of Hyperterminal screen.
- void maxim_menu_print_maxim_banner_big ()

  Print large Maxim banner at top of Hyperterminal screen.
- void maxim_menu_print_prompt ()

  Print a standard prompt for keyboard input " > ".
- void maxim_menu_print_line ()

  Print one line of dashes across the screen via Hyperterminal.
- uint8_t maxim_menu_retrieve_keypress ()

  Get a single keypress via Hyperterminal.
- void maxim_menu_print_main_menu ()

  Print the main menu listing choice of module to test.
- void maxim_menu_print_configuration_description ()

  Print configuration byte description.
- void maxim_menu_print_output_data_description ()

  Print output data byte description.

3.6.1 Detailed Description

****

Project: MAXREFDES64# Filename: menu.c Description: This module contains all the functions used to generate the menus and menu options used to run the MAXREFDES64# example firmware.

Revision History:

10/07/2014 Rev 01.00 MG Initial release.

This code follows the following naming conventions:

char ch_pmod_value

char (array) s_pmod_string[16]

float f_pmod_value

int n_pmod_value

int (array) an_pmod_value[16]

u16 u_pmod_value

u16 (array) au_pmod_value[16]

u8 uch_pmod_value

u8 (array) auch_pmod_buffer[16]

unsigned int un_pmod_value

int * pun_pmod_value

Definition in file menu.c.

3.6.2 Function Documentation

3.6.2.1 void maxim_menu_cls (void)

Function to clear the screen via Hyperterminal.

Parameters

None	

Return values

None	

Definition at line 65 of file menu.c.

3.6.2.2 void maxim_menu_print_configuration_description (void)

Print configuration byte description.

Details.

Return values

None	

Definition at line 224 of file menu.c.

3.6.2.3 void maxim_menu_print_line ( )

Print one line of dashes across the screen via Hyperterminal.

Parameters

None	

Return values

None	

Definition at line 150 of file menu.c.

3.6.2.4 void maxim_menu_print_main_menu (void)

Print the main menu listing choice of module to test.

Details.

Return values

None	

Definition at line 207 of file menu.c.

3.6.2.5 void maxim_menu_print_maxim_banner (void)

Print standard Maxim banner at top of Hyperterminal screen.

Parameters

None	

Return values

None	

Definition at line 79 of file menu.c.

3.6.2.6 void maxim_menu_print_maxim_banner_big (void)

Print large Maxim banner at top of Hyperterminal screen.

Parameters

None	

Return values

None	

Definition at line 103 of file menu.c.

3.6.2.7 void maxim_menu_print_output_data_description (void)

Print output data byte description.

Details.

Return values

None	

Definition at line 242 of file menu.c.

3.6.2.8 void maxim_menu_print_prompt (void)

Print a standard prompt for keyboard input " > ".

Parameters

None	

Return values

None	

Definition at line 136 of file menu.c.

3.6.2.9 uint8_t maxim_menu_retrieve_keypress (void)

Get a single keypress via Hyperterminal.

Details

Returns ascii character corresponding to keypress with some preprocessing.
Escape sequences (Arrow keys and END) are mapped to decimal 240-244 (see defines)
Characters "0"-"9" converted to numbers 0-9
Lower case "a"-"z" converted to uppercase "A"-"Z"

Parameters

None	

Return values

Character,partially	decoded.

Definition at line 163 of file menu.c.

3.7 menu.h File Reference

```
#include "stm32f10x.h"
#include "stdio.h"
```

Macros

- #define MAIN_MENU 0

// Menu state machine state

- #define WAIT_KEYPRESS 1

  // Menu state machine state
- #define CONTINUOUS_READ_MENU 2

  // Menu state machine state
- #define SINGLE_READ_MENU 3

  // Menu state machine state
- #define KEYPRESS_ARROW_UP 240

  Assign up-arrow an extended ascii code which won't be used elsewhere.
- #define KEYPRESS_ARROW_DOWN 241

  Assign up-arrow an extended ascii code which won't be used elsewhere.
- #define KEYPRESS_ARROW_LEFT 242

  Assign up-arrow an extended ascii code which won't be used elsewhere.
- #define KEYPRESS_ARROW_RIGHT 243

  Assign up-arrow an extended ascii code which won't be used elsewhere.
- #define KEYPRESS_END 244

  Assign up-arrow an extended ascii code which won't be used elsewhere.

Functions

- void maxim_menu_cls (void)

  Function to clear the screen via Hyperterminal.
- void maxim_menu_print_maxim_banner (void)

  Print standard Maxim banner at top of Hyperterminal screen.
- void maxim_menu_print_maxim_banner_big (void)

  Print large Maxim banner at top of Hyperterminal screen.
- void maxim_menu_print_prompt (void)

  Print a standard prompt for keyboard input " > ".
- uint8_t maxim_menu_retrieve_keypress (void)

  Get a single keypress via Hyperterminal.
- void maxim_menu_print_main_menu (void)

  Print the main menu listing choice of module to test.
- void maxim_menu_print_configuration_description (void)

  Print configuration byte description.
- void maxim_menu_print_output_data_description (void)

  Print output data byte description.

3.7.1 Detailed Description

****

Project: MAXREFDES64# Filename: menu.h Description: This module contains all the functions used to generate the menus and menu options used to run the MAXREFDES64 example firmware.

Revision History:

10/07/2014 Rev 01.00 MG Initial release.

This code follows the following naming conventions:

char ch_pmod_value

char (array) s_pmod_string[16]

float f_pmod_value

int n_pmod_value

int (array) an_pmod_value[16]

u16 u_pmod_value

u16 (array) au_pmod_value[16]

u8 uch_pmod_value

u8 (array) auch_pmod_buffer[16]

unsigned int un_pmod_value

int * pun_pmod_value

Definition in file menu.h.

3.7.2 Macro Definition Documentation

3.7.2.1 #define CONTINUOUS_READ_MENU 2

// Menu state machine state

Definition at line 70 of file menu.h.

3.7.2.2 #define KEYPRESS_ARROW_DOWN 241

Assign up-arrow an extended ascii code which won't be used elsewhere.

Definition at line 74 of file menu.h.

3.7.2.3 #define KEYPRESS_ARROW_LEFT 242

Assign up-arrow an extended ascii code which won't be used elsewhere.

Definition at line 75 of file menu.h.

3.7.2.4 #define KEYPRESS_ARROW_RIGHT 243

Assign up-arrow an extended ascii code which won't be used elsewhere.

Definition at line 76 of file menu.h.

3.7.2.5 #define KEYPRESS_ARROW_UP 240

Assign up-arrow an extended ascii code which won't be used elsewhere.

Definition at line 73 of file menu.h.

3.7.2.6 #define KEYPRESS_END 244

Assign up-arrow an extended ascii code which won't be used elsewhere.

Definition at line 77 of file menu.h.

3.7.2.7 #define MAIN_MENU 0

// Menu state machine state

Definition at line 68 of file menu.h.

3.7.2.8 #define SINGLE_READ_MENU 3

// Menu state machine state

Definition at line 71 of file menu.h.

3.7.2.9 #define WAIT_KEYPRESS 1

// Menu state machine state

Definition at line 69 of file menu.h.

3.7.3 Function Documentation

3.7.3.1 void maxim_menu_cls (void)

Function to clear the screen via Hyperterminal.

Parameters

None	

Return values

None	

Definition at line 65 of file menu.c.

3.7.3.2 void maxim_menu_print_configuration_description (void)

Print configuration byte description.

Details.

Return values

None	

Definition at line 224 of file menu.c.

3.7.3.3 void maxim_menu_print_main_menu (void)

Print the main menu listing choice of module to test.

Details.

Return values

None	

Definition at line 207 of file menu.c.

3.7.3.4 void maxim_menu_print_maxim_banner (void)

Print standard Maxim banner at top of Hyperterminal screen.

Parameters

None	

Return values

None	

Definition at line 79 of file menu.c.

3.7.3.5 void maxim_menu_print_maxim_banner_big (void)

Print large Maxim banner at top of Hyperterminal screen.

Parameters

None	

Return values

None	

Definition at line 103 of file menu.c.

3.7.3.6 void maxim_menu_print_output_data_description (void)

Print output data byte description.

Details.

Return values

None	

Definition at line 242 of file menu.c.

3.7.3.7 void maxim_menu_print_prompt (void)

Print a standard prompt for keyboard input " > ".

Parameters

None	

Return values

None	

Definition at line 136 of file menu.c.

3.7.3.8 uint8_t maxim_menu_retrieve_keypress (void)

Get a single keypress via Hyperterminal.

Details

Returns ascii character corresponding to keypress with some preprocessing.
Escape sequences (Arrow keys and END) are mapped to decimal 240-244 (see defines)
Characters "0"-"9" converted to numbers 0-9
Lower case "a"-"z" converted to uppercase "A"-"Z"

Parameters

None	

Return values

Character,partially	decoded.

Definition at line 163 of file menu.c.

3.8 retarget.c File Reference

```
#include <stdio.h>
#include <rt_misc.h>
#include "stm32f10x.h"
#include "stm32f10x_usart.h"
```

Functions

- int sendchar (int c)
- int getkey (void)
- int fputc (int c, FILE *f)
- int fgetc (FILE *f)
- int ferror (FILE *f)
- void _ttywrch (int c)
- void _sys_exit (int return_code)

3.8.1 Detailed Description

****

Project: MAXREFDES64# Filename: retarget.c Description: This file redefines functions used by printf() for outputting characters and getchar() for inputting characters. The printf() function ultimately relies on the fputc() function to operate. The fputc() has been implemented using USART_SendData() Similarly, getchar() relies on the fgetc() function to operate. fgetc() has been implemented using USART_ReceiveData()

Revision History:

04-05-13 Rev 01.00 MTS Initial release.

02-27-14 Rev 02.00 MTS Re-release.

This code follows the following naming conventions:

char ch_pmod_value

char (array) s_pmod_string[16]

float f_pmod_value

int n_pmod_value

int (array) an_pmod_value[16]

u16 u_pmod_value

u16 (array) au_pmod_value[16]

u8 uch_pmod_value

u8 (array) auch_pmod_buffer[16]

unsigned int un_pmod_value

int * pun_pmod_value

Definition in file retarget.c.

3.8.2 Function Documentation

3.8.2.1 void _sys_exit (int *return_code*)

Definition at line 115 of file retarget.c.

3.8.2.2 void _ttywrch (int *c*)

Definition at line 108 of file retarget.c.

3.8.2.3 int ferror (FILE * f)

Definition at line 102 of file retarget.c.

3.8.2.4 int fgetc (FILE * f)

Definition at line 91 of file retarget.c.

3.8.2.5 int fputc (int c, FILE * f)

Definition at line 83 of file retarget.c.

3.8.2.6 int getkey (void)

3.8.2.7 int sendchar (int c)

3.9 utilities.c File Reference

```
#include "utilities.h"
#include "stm32f10x.h"
#include "stdio.h"
#include "stdlib.h"
```

Functions

- void maxim_delay (uint32_t un_delay)

  Delay function.
- int maxim_get_hex (void)

  Receive inputs from UART and convert the HEX values to interger.
- int maxim_htoi (char *ps_str)

  Convert HEX to interger.

3.9.1 Detailed Description

****

Project: MAXREFDES64# Filename: utilities.c Description: This module contains a collection of general utility functions which are not specific to any particular module.

Revision History:

10/07/2014 Rev 01.00 MG Initial release.

This code follows the following naming conventions:

char ch_pmod_value

char (array) s_pmod_string[16]

float f_pmod_value

int n_pmod_value

int (array) an_pmod_value[16]

u16 u_pmod_value

u16 (array) au_pmod_value[16]

u8 uch_pmod_value

u8 (array) auch_pmod_buffer[16]

unsigned int un_pmod_value

int * pun_pmod_value

Definition in file utilities.c.

3.9.2 Function Documentation

3.9.2.1 void maxim_delay (uint32_t *un_delay*)

Delay function.

Parameters

in	*un_delay*	-delay factor

Return values

None	

Definition at line 67 of file utilities.c.

3.9.2.2 int maxim_get_hex (void)

Receive inputs from UART and convert the HEX values to interger.

Parameters

None	

Return values

None	

Definition at line 80 of file utilities.c.

3.9.2.3 int maxim_htoi (char * *ps_str*)

Convert HEX to interger.

Parameters

in	*ps_str*	- a string that contains the hex value in ascii characters

Return values

None	

Definition at line 104 of file utilities.c.

3.10 utilities.h File Reference

```
#include "stm32f10x.h"
```

Macros

- #define ONE_SECOND 7200000

Functions

- void maxim_delay (uint32_t un_delay)

  Delay function.
- int maxim_htoi (char *str)

  Convert HEX to interger.
- int maxim_get_hex (void)

  Receive inputs from UART and convert the HEX values to interger.

3.10.1 Detailed Description

```
*****************************************************
```

Project: MAXREFDES64# Filename: utilities.h Description: This module contains a collection of general utility functions which are not specific to any particular module.

Revision History:

10/07/2014 Rev 01.00 MG Initial release.

This code follows the following naming conventions:

char ch_pmod_value

char (array) s_pmod_string[16]

float f_pmod_value

int n_pmod_value

int (array) an_pmod_value[16]

u16 u_pmod_value

u16 (array) au_pmod_value[16]

u8 uch_pmod_value

u8 (array) auch_pmod_buffer[16]

unsigned int un_pmod_value

int * pun_pmod_value

Definition in file utilities.h.

3.10.2 Macro Definition Documentation

3.10.2.1 #define ONE_SECOND 7200000

Definition at line 66 of file utilities.h.

3.10.3 Function Documentation

3.10.3.1 void maxim_delay (uint32_t *un_delay*)

Delay function.

Parameters

in	*un_delay*	-delay factor

Return values

None	

Definition at line 67 of file utilities.c.

3.10.3.2 int maxim_get_hex (void)

Receive inputs from UART and convert the HEX values to interger.

Parameters

None	

Return values

None	

Definition at line 80 of file utilities.c.

3.10.3.3 int maxim_htoi (char * *ps_str*)

Convert HEX to interger.

Parameters

in	*ps_str*	- a string that contains the hex value in ascii characters

Return values

None	

Definition at line 104 of file utilities.c.

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